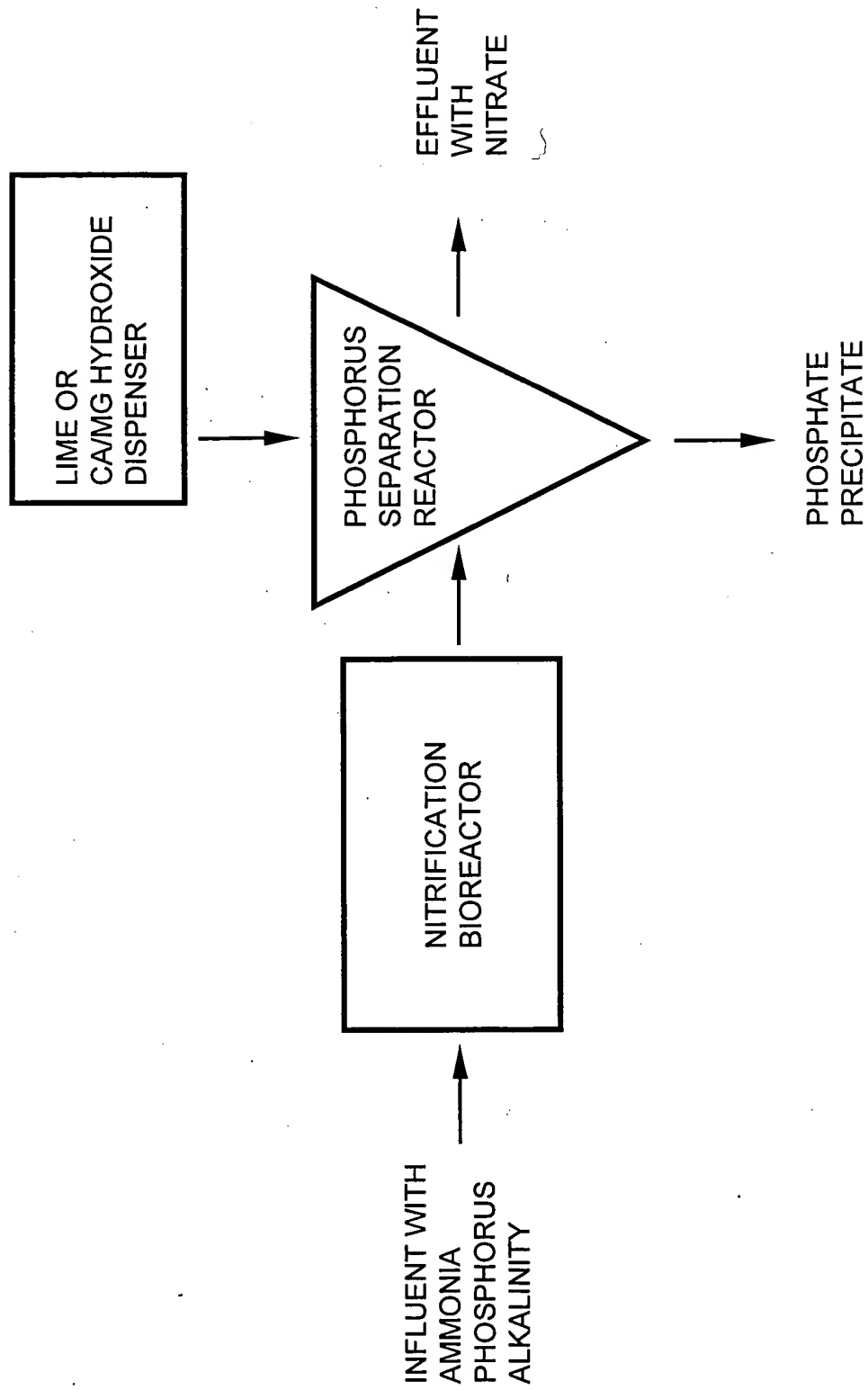


FIG. 1



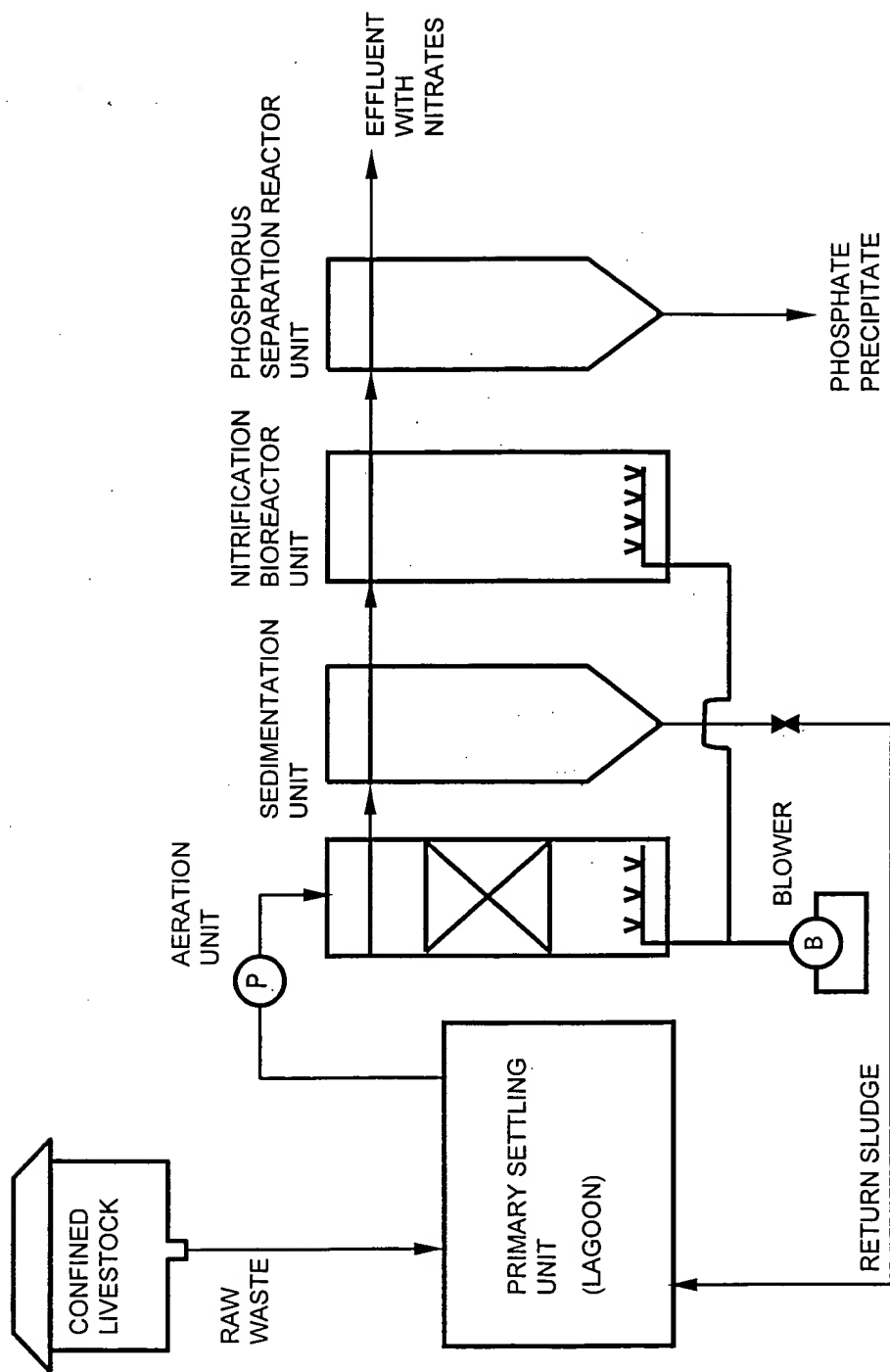
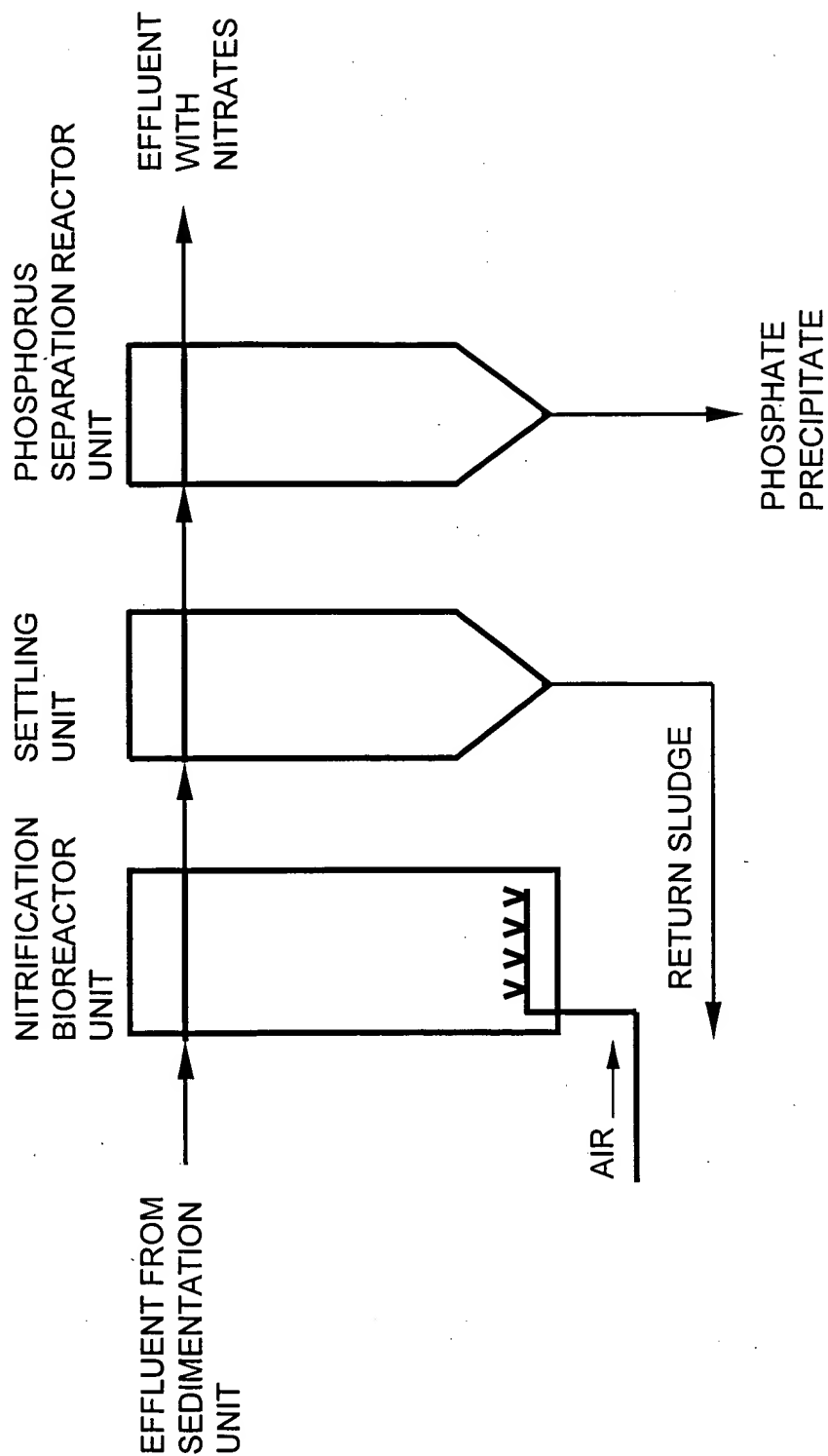


FIG. 2

FIG. 3



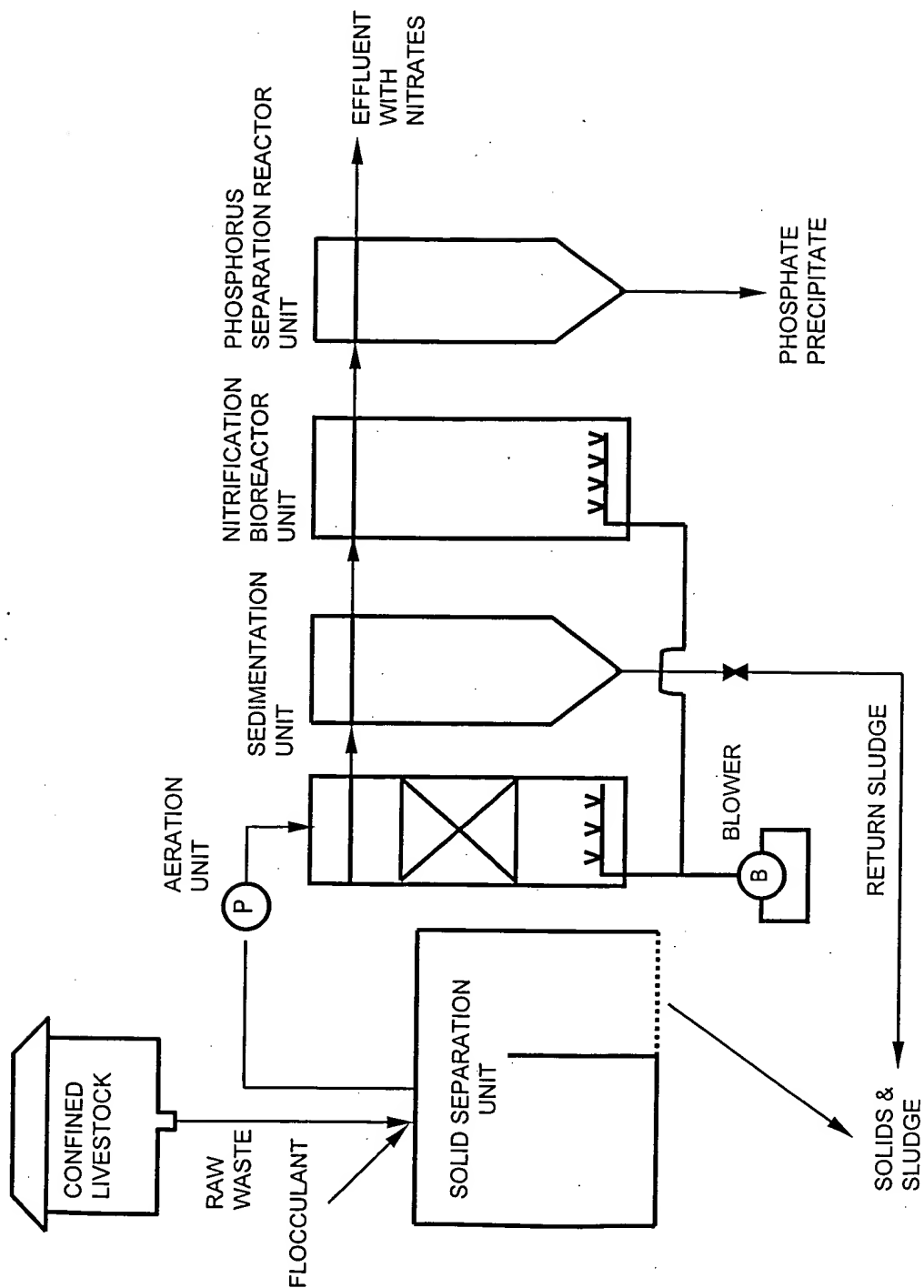


FIG. 4

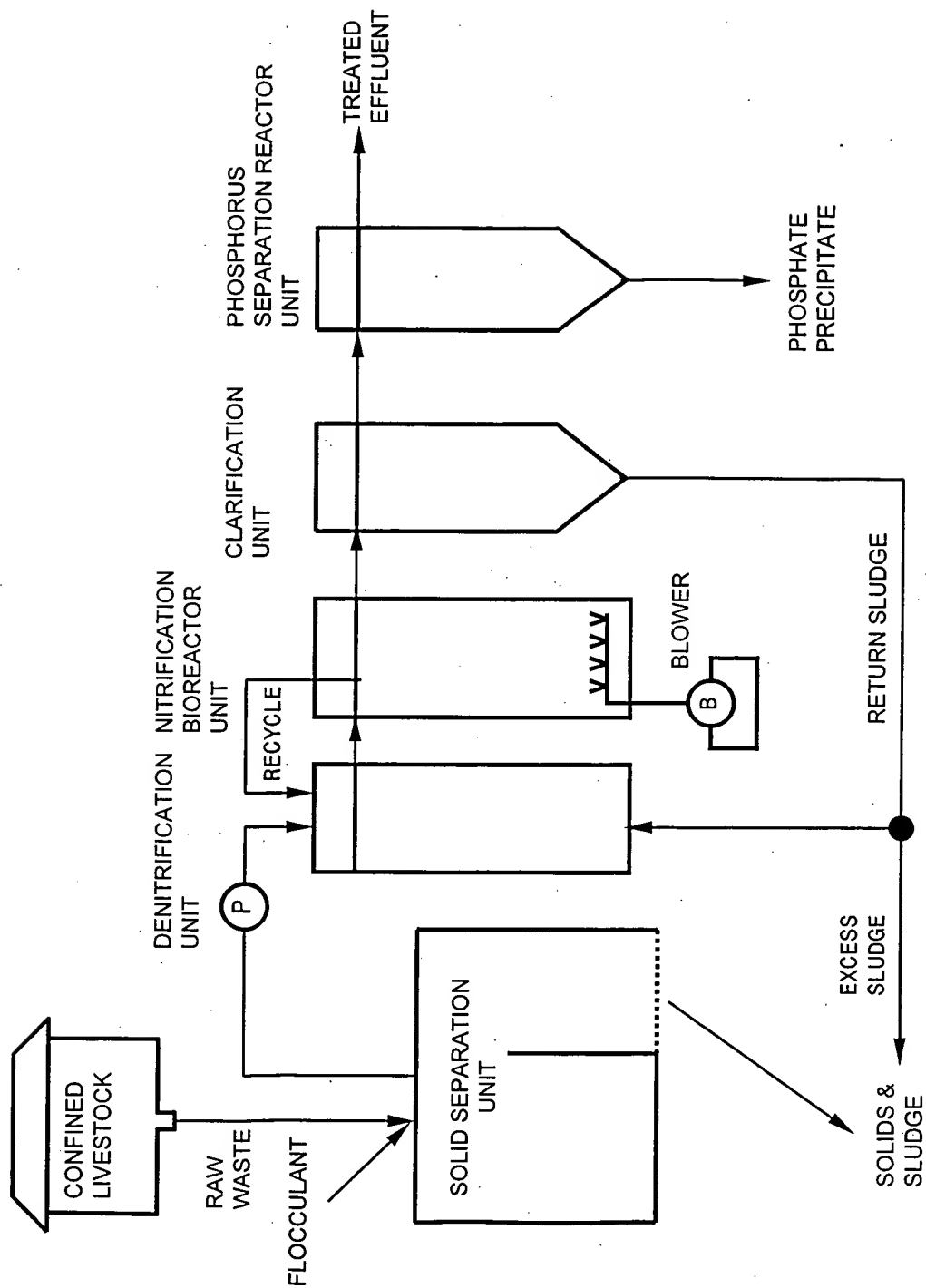
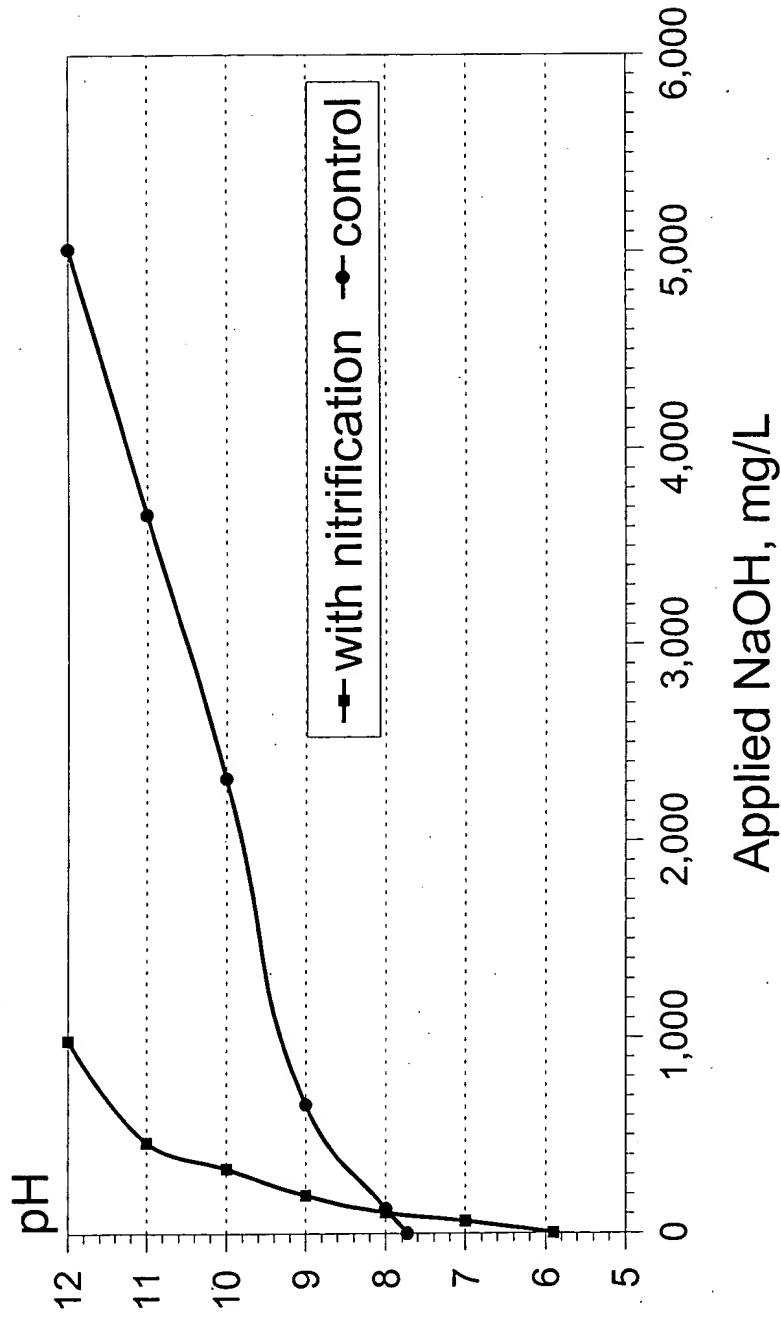


FIG. 5

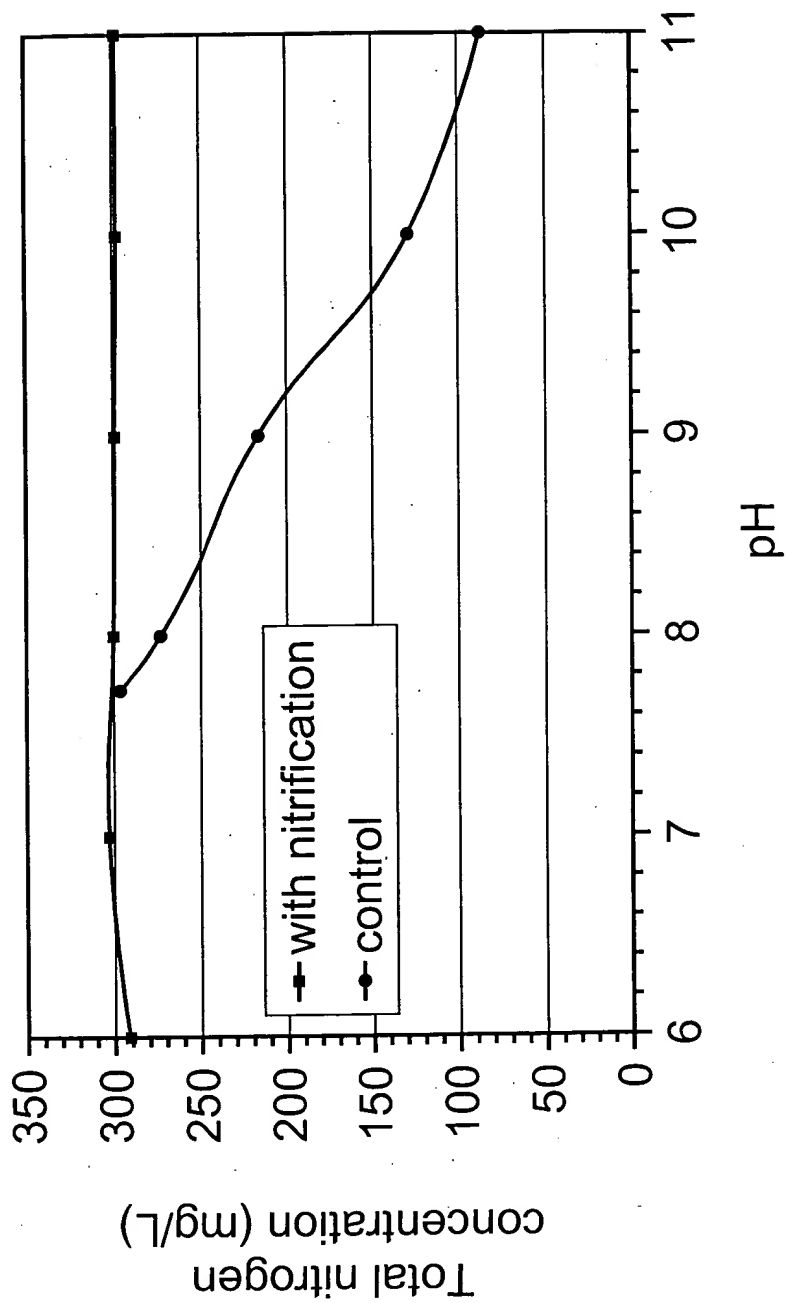


EFFECT OF ALKALI ADDITION ON pH OF SWINE WASTEWATER THAT
RECEIVED NITRIFICATION PRETREATMENT VS. CONTROL

FIG. 6

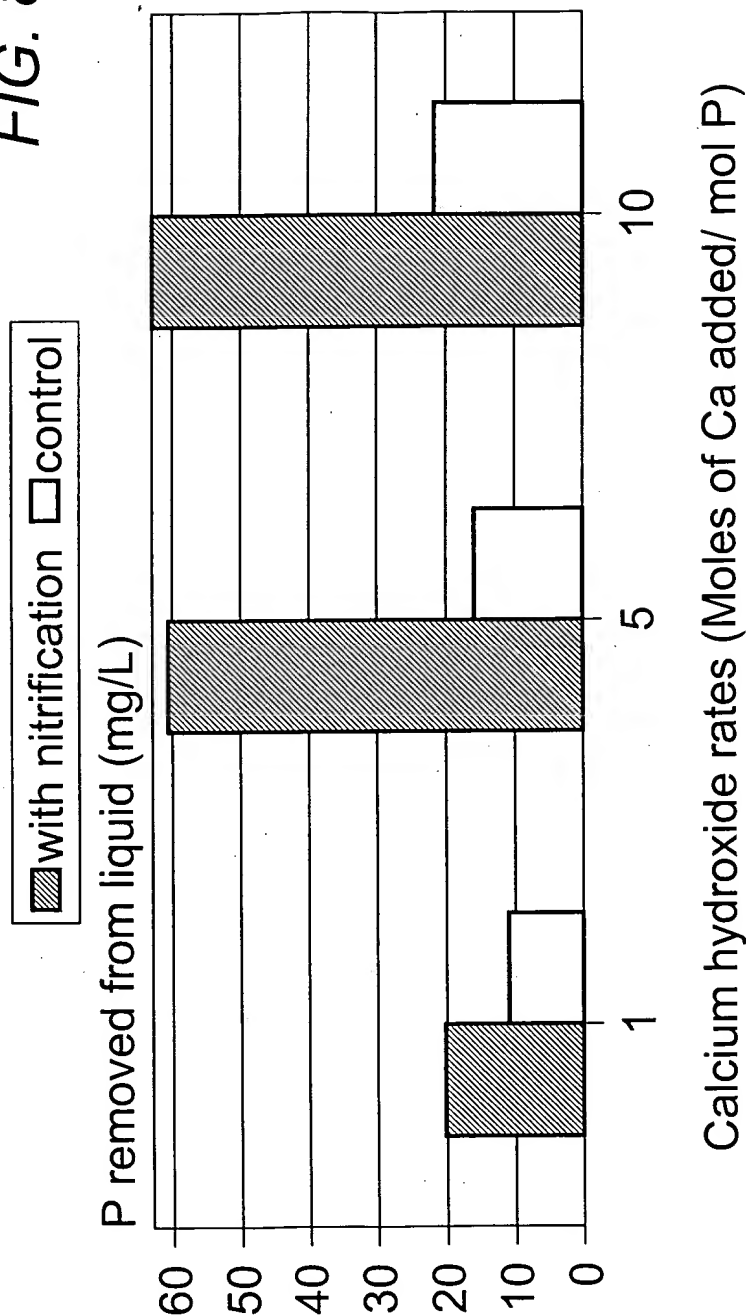
Nitrogen losses in swine wastewater
by ammonia volatilization

FIG. 7



Phosphorus removal from swine wastewater using Calcium Hydroxide

FIG. 8



Initial conditions:

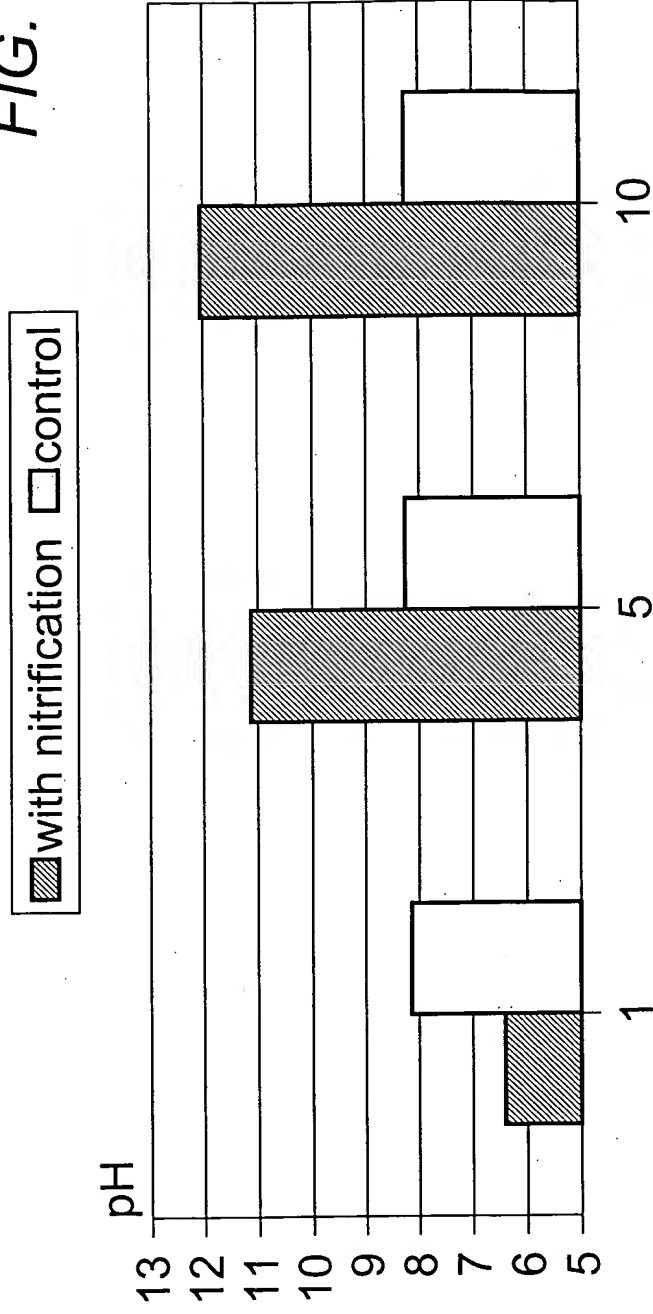
PO₄-P= 63 mg/L, pH= 8.05, alkalinity=1890 mg/L, NH₄-N=300 mg/L

After nitrification:

$\text{PO}_4\text{-P}=63\text{ mg/L}$, $\text{pH}=6.06$, alkalinity= 63 mg/L , $\text{NH}_4\text{-N}=61\text{ mg/L}$

Phosphorus removal from swine wastewater
using Calcium Hydroxide: effect on pH

FIG. 9



Calcium hydroxide rates (Moles of Ca added/ mol P)

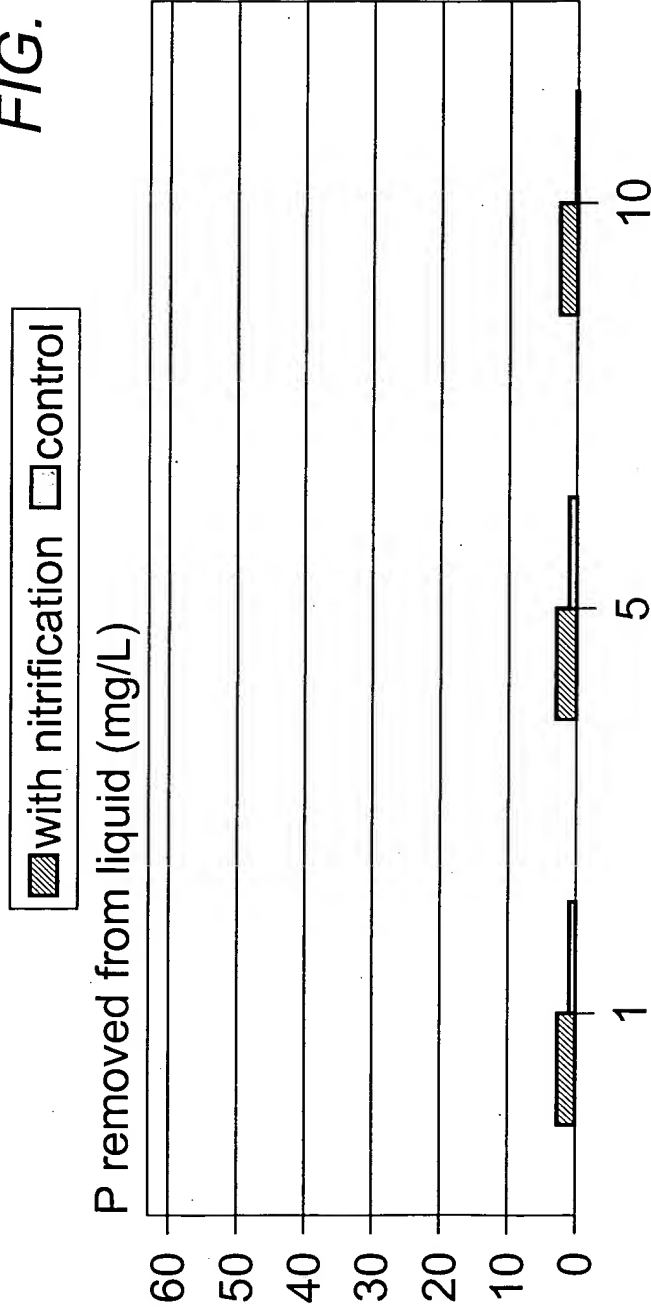
Initial conditions:

$\text{PO}_4\text{-P}$ = 63 mg/L, pH = 8.05, alkalinity = 1890 mg/L, $\text{NH}_4\text{-N}$ = 300 mg/L

After nitrification:

$\text{PO}_4\text{-P}$ = 63 mg/L, pH = 6.06, alkalinity = 63 mg/L, $\text{NH}_4\text{-N}$ = 61 mg/L

FIG. 10



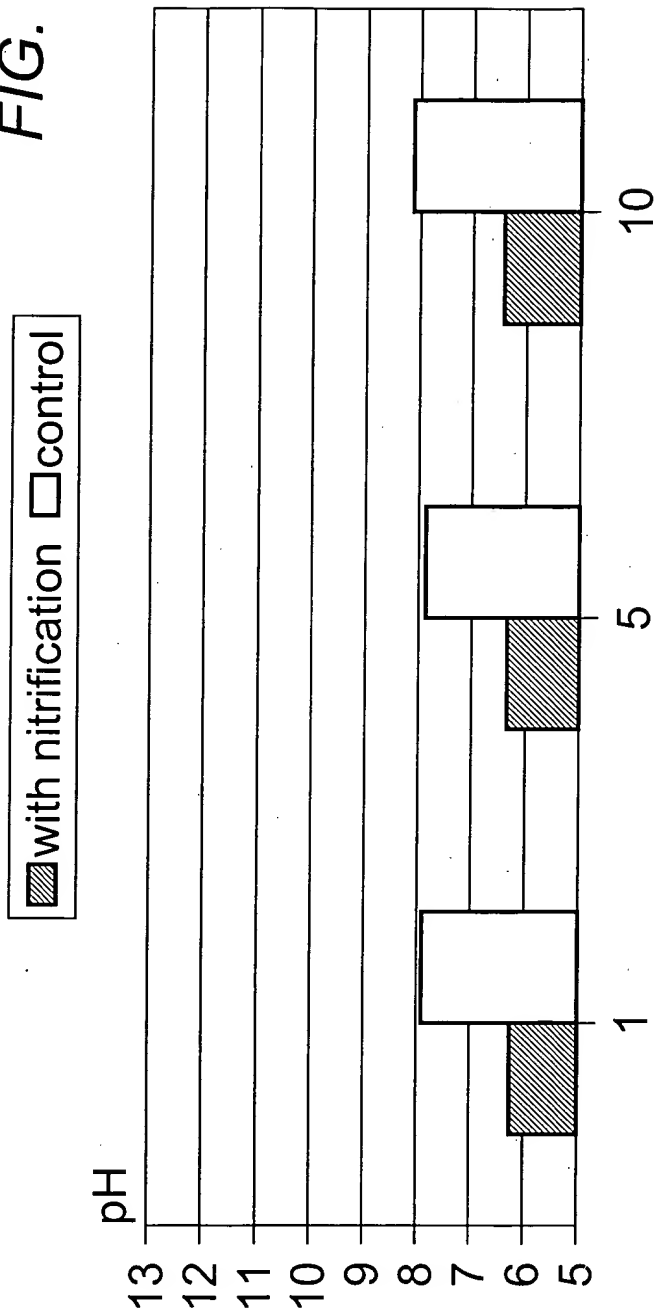
Calcium carbonate rates (Moles of Ca added/ mol P)

PO₄-P= 63 mg/L, pH= 8.05, alkalinity=1890 mg/L, NH₄-N=300 mg/L

PO₄-P= 63 mg/L, pH= 6.06, alkalinity=63 mg/L, NH₄-N=61 mg/L

Application of Carbonate lime to swine wastewater
did not affect pH or phosphorus removal.

FIG. 11



Calcium carbonate rates (Moles of Ca added/ mol P)

Initial conditions:

$\text{PO}_4\text{-P}$ = 63 mg/L, pH = 8.05, alkalinity = 1890 mg/L, $\text{NH}_4\text{-N}$ = 300 mg/L

After nitrification:

$\text{PO}_4\text{-P}$ = 63 mg/L, pH = 6.06, alkalinity = 63 mg/L, $\text{NH}_4\text{-N}$ = 61 mg/L